A FUNCTIONAL COMPARISON OF THE NAVAL AVIATION LOGISTICS COMMAND MANAGEMENT INFORMATION SYSTEM (NALCOMIS) AND THE SHIPBOARD UNFIORM AUTOMATED DATA PROCESSING SYSTEM-REAL TIME (SUADPS-RT)

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THESIS

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by

Syd W. Rodenbarger

June 1982

Thesis Advisor: Norman Schneidewind

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) A Functional Comparison of the Naval Aviation Logistics Command Management Information System (NALCOMIS) and the Shipboard Uniform Automated Data Processing System-Real Time (SUADPS-RT)		5. TYPE OF REPORT & PERIOD COVERED Master's Thesis June 1982
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Syd W. Rodenbarger		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS Naval Postgraduate School Monterey, California 93940		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS Naval Postgraduate School Monterey, California 93940		12. REPORT DATE June 1982
		13. NUMBER OF PAGES 81
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		15. SECURITY CLASS. (of this report)
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

Approved for public release; distribution unlimited

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Management Information Systems, NALCOMIS, SUADPS-RT, Aviation Supply Support Afloat, Aviation Maintenance Management Afloat, SNAP

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

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DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE
S/N 0102-014-6601

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

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Submitted in partial fulfillment of the
requirements for the degree of

MASTER OF SCIENCE IN INFORMATION SYSTEMS

from the

NAVAL POSTGRADUATE SCHOOL
June 1982

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Two important Management Information Systems currently under development are the Naval Aviation Logistics Command Management System (NALCOMIS) and the Shipboard Uniform Automated Data Processing System-Real Time (SUADPS-RT). Both of these systems address the functions of aviation supply support afloat and are envisioned for implementation on replacement state-of-the-art hardware being procured under the Shipboard Non-Tactical ADP Program (SNAP). Both systems are being developed as on-line, real-time MISs designed to provide maintenance and material managers with information concerning the management of aviation maintenance and supply support. This thesis investigates these two systems and determines those functional areas where duplication exists. Recommendations concerning the incorporation of the functional differences of the two systems are also provided.

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I. INTRODUCTION

A. GENERAL INTRODUCTION

The logistics support of Naval Aviation is a complex and oftentimes esoteric undertaking that encompasses thousands of people and billions of dollars worth of material assets. There are several classical logistics elements that comprise the overall concept of logistics support. These elements include such areas as personnel, training, supply support and maintenance. Specifically, the supply support and maintenance required to support Naval Aviation represents not only a major investment in defense funding, but also represents an important factor in the attainment of overall national defense goals. Naval Aviation continues to be in the forefront of every confrontation requiring a rapid response to potentially damaging situations.

The operation and management of both areas of supply support and maintenance are, by themselves, extremely complex tasks. The Naval Supply System is a multilevel organization that is worldwide in scope, capable of responding rapidly to changes in operational requirements and embraces virtually every naval activity. Similarly, the Naval Aviation Maintenance Program (NAMP) defines the organization required for the performance and conduct of aircraft maintenance. The NAMP also encompasses multilevels including both organizational responsibilities as well as major systems command responsibilities. Both the Naval Supply System and the Naval Aviation Maintenance Program are administered via separate directives and procedures within the Navy Department.

The nature of Naval Aviation has evolved into a highly technological enterprise. These technological advances offer highly sophisticated, as well as highly expensive, weapons systems to the fleet. The increased sophistication has also necessitated the requirement for improvements in the logistics systems. [Ref. 1: p. vi] Specifically, a need has arisen for systems designed to improve the management and operation of both the supply support and maintenance functions. This need has been recognized by the Navy since several systems dealing with the management of both aspects of supply support and maintenance are currently in place and operational or are in the design and development phase. These "systems" take many forms, ranging from locally designed and developed Management Information Systems (MIS) and automated data entry systems to more general MISs designed and developed to perform various functions in the accomplishment of overall supply and maintenance objectives. Noteworthy is the fact that there are numerous such systems in operation or development at any one time--oftentimes overlapping in their objectives and final products.

Since both disciplines, maintenance and supply, tend to operate within separate functional areas, and yet constantly interface, it is important that any particular system under development minimize any duplication of functions between other such systems. Additionally, it is important that information generated by a particular system be made available, if applicable, to other systems. Only through such a coordinated effort can maximum efficiency of both resources and information be realized.

The issue of coordinated effort and maximum efficiency in the design and development phases is very critical in the areas of automated MIS

and general ADP systems. The continued growth and utilization of electronic computers with large data storage capacity has enhanced the ability to provide large amounts of data that is useful to managers at all levels. Unfortunately, at least from the perspective of afloat operations, there is a limit to the physical size and capacity of data processing capability. Improvements in technology may allow for dramatic increases in capability in the future, but for the present, careful consideration should be given to ensuring minimum levels of duplication within computer based systems in the afloat environment.

Over the past several years, the dominant MIS under development within the aviation community has been the Naval Aviation Logistics Command Management Information System (NALCOMIS). NALCOMIS is a complex and multifaceted computer based MIS designed to provide aviation maintenance managers with decision making information. NALCOMIS is a state-of-the-art, high technology, on-line, real-time computer based NIS that will be installed in approximately ninety Naval Aviation activities including both ashore and afloat units. Throughout its development it has expanded to include virtually every aspect of aviation maintenance. In addition, various aspects of the supply support function are also included.

Unfortunately, the design and development of NALCOMIS has been slow. [Ref. 1: p. A-27] Few aviation maintenance and material managers can dismiss the need for such a MIS; however, it is the opinion of the author that the timeframe for fleet introduction of NALCOMIS remains a serious detriment to the ultimate success of the endeavor.

A substantial amount of effort and resources has been expended in the NALCOMIS effort to date. [Ref. 1: p. A-27] An alternate approach to the

NALCOMIS initiative might be to utilize various component parts of the NALCOMIS effort within operational or planned ADP systems. The opinion of the author is that the Navy, by adopting such an approach, could benefit significantly from the work already completed on NALCOMIS. In addition, this approach would help to alleviate unnecessary duplications as well as possibly enhancing the overall capabilities of other ADP systems.

This thesis will briefly examine and describe NALCOMIS with a viewpoint toward possible inclusion of NALCOMIS functions within existing ADP systems. Specifically, the thesis will investigate the possible inclusion of NALCOMIS functions within the Shipboard Uniform Automated Data Processing System-Real Time (SUADPS-RT).

B. THESIS OBJECTIVES

The objectives of this thesis are as follows:

(1) Provide the reader an insight and understanding of NALCOMIS and SUADPS-RT be briefly describing these two systems.

(2) Compare the functions of NALCOMIS and SUADPS-RT for possible duplications and determine those functional areas within NALCOMIS that warrant possible consideration for inclusion within SUADPS-RT.

(3) Offer conclusions and recommendations concerning the results of the research.

C. APPROACH

The material presented in this thesis is meant to act as an educational tool for the author in order to provide useful knowledge of both NALCOMIS and SUADPS-RT. To this end, the study focuses on the current documentation

available concerning the two systems with particular emphasis being placed on Functional Descriptions (FDs) and design specifications.

Additionally, the thesis will be useful as a tool for the SUADPS-RT functional manager when considering future enhancements to the SUADPS-RT system. It is recognized that much of this depends upon the ultimate decision regarding the future of NALCOMIS. Nevertheless, if NALCOMIS becomes a reality, the successful interfacing of the NALCOMIS and SUADPS-RT systems would be warranted. The material here may enhance early interface decisions.

D. SCOPE AND LIMITATIONS

Both NALCOMIS and SUADPS-RT are extremely large and complex systems requiring a multitude of documentation including numerous system flow charts and detailed requirements. Additionally, volumes of material have been produced regarding system specifications, hardware impacts, and system environments. It is well beyond the scope of this thesis to address every detail of the two systems. The thesis is therefore limited to the following areas of research:

(1) Research is centered on defining those functional areas within NALCOMIS that represent duplications of functions currently included within the SUADPS-RT FD.

(2) The scope is limited to addressing only functional areas. While it may become necessary to address such considerations as hardware, software, data base considerations, environment, and system architecture, the thrust of the thesis is not toward these areas. These areas are, however, examined to some degree when defining the two systems.

(3) NALCOMIS specifically addresses virtually every aspect of the Naval Aviation Maintenance Program. Many of the functions deal specifically with the maintenance effort and have no direct impact upon the supply support function as addressed by SUADPS-RT. Therefore, only those functions of NALCOMIS pertaining to supply support will be discussed.

E. THESIS FORMAT

The basic content of this thesis is presented in Chapters II, III, and IV. Appendix A relates specifically to Chapter IV. Chapter V contains conclusions and recommendations.

Chapters II and III deal with discussion of NALCOMIS and SUADPS-RT respectively. In the writing of these two chapters, extensive use was made of the NALCOMIS and SUADPS-RT Functional Descriptions. Chapter summaries are provided as a means of gaining substance from these areas without having to peruse the entire chapter.

Chapter IV is supplemented by the information contained in Appendix A. In this regard, the chapter summary for Chapter IV applies to the information contained in both Chapter IV and Appendix A.

An appreciation for the contents of the thesis may be obtained merely by reading the chapter summaries. In addition, a Summary of Findings is presented as Section F of Chapter I.

Finally, the thesis contains a substantial number of acronyms. Appendix B provides a glossary of these acronyms.

F. SUMMARY OF FINDINGS

Several duplications exist between the subsystem of NALCOMIS Module 1 that deals with the management of aviation supply support and SUADPS-RT.

Specifically, four of the five NALCOMIS subfunctions pertaining to supply support are similar enough, either directly or functionally, as to consider them identical with functions listed in SUADPS-RT.

II. NALCOMIS FUNCTIONAL OVERVIEW

A. THE NAVAL AVIATION MAINTENANCE PROGRAM (NAMP)

Established in 1959 by the Chief of Naval Operations (CNO), the Naval Aviation Maintenance Program (NAMP) is a fully integrated system for performing aeronautical equipment maintenance. Over the years it has evolved through many changes and today represents an up-to-date program that addresses all levels of aviation maintenance in the Navy. The NAMP is built upon the concept of three levels of maintenance: the Organizational Maintenance Activity (OMA), the Intermediate Maintenance Activity (IMA), and the Depot Maintenance Activity. Figure 2-1 displays this concept including a brief explanation of the types of maintenance performed at each activity. The key objective of the NAMP can best be highlighted by the following excerpt from the NAMP Instruction, OPNAV Instruction 4790.2B:

> "The objective of the NAMP is to achieve and maintain maximum material readiness, safety, and conservation of material through command attention, policy direction, technical direction, management, and administration of all programs affecting activities responsible for aviation maintenance, including associated material and equipment. It encompasses the accomplishment of repair of aeronautical equipment and material at the level of maintenance which will ensure optimum economic use of resources; the protection of weapons systems from corrosive elements through the prosecution of an active corrosion control program; and the collection, analysis, and use of pertinent data in order to effectively improve our material readiness and safety while simultaneously increasing the efficient and economical management of our human, monetary, and material resources."

As indicated previously, the NAMP has undergone several changes and improvements since its inception. These changes were necessitated for a variety of reasons, the least of which was the continuing need for a

Level	Description
Organizational Level (OMA)	Includes those upkeep Maintenance functions normally performed by an operating squadron. Types of maintenance include inspection, servicing and handling of equipment as well as corrective and preventative maintenance including removal and replacement of defective parts and components.
Intermediate Level (IMA)	Includes maintenance which is performed by designated maintenance activities in support of operating squadrons. Maintenance actions include calibration, off-equipment repair or replacement of damaged or unserviceable parts, components or assemblies and the manufacture of certain non-available parts.
Depot Level (DOP)	Includes the rework of material requiring major overhaul or a complete rebuilding of parts, assemblies, subassemblies and end items. Maintenance includes manufacture of parts, modifications, testing, engineering assistance and the performance of maintenance beyond the capability of the lower levels.

OMA ——— IMA ——— DOP

Lowest ———→ Highest

Figure 2-1 The Three Levels of Naval Aviation Maintenance Concept

variety of data relating to aviation maintenance. Early astute maintenance managers realized that operational, maintenance, and logistics support data are key elements in maintenance related decision making. This fact, coupled with the advent of the electronic ADP systems of the early 1960's, led to the birth of the Naval Aviation Maintenance and Material Management (3-M) System, referred to as the 3-M System.

The 3-M System was introduced in January 1965 for the purpose of providing for maintenance data collection, man-hour accounting, and aircraft accounting systems as part of the NAMP. [Ref. 2: p.13] The 3-M System offers a Navywide standard by which all maintenance data is collected and, by virtue of this standardized concept, lends itself to processing via ADP equipment. It should be noted that the prime purpose of the 3-M System was the collection of data for maintenance managers throughout all levels of maintenance. However, as implemented, the 3-M System actually provides for data collection geared for use by upper level management with limited use by lower level maintenance managers. [Ref. 3: p. 16]

A brief discussion of the shortcomings of the 3-M System is warranted. The main reason for the shortcomings in the system is the manual collection of data which was necessitated by the limitations of the Electronic Accounting Machine (EAM) technology at the time of system introduction. [Ref. 3: p. 16] This manual collection of data led to inefficiency with the transfer of data from the manual collection documents to machine readable form, placed a heavy documentation load on users, led to error prone data collection, and presented delays in information and data processing. [Ref. 1: p. B-2] The 3-M System does not provide an

effective man/machine interface to collect and process data at the local level in a timely and accurate manner. This weakness has led to a natural relunctancy on the part of all maintenance managers to base decision making on data received through the 3-M System. [Ref. 1: pp. B-4, B-5]

Finally, as the complexity of weapons systems has increased, the volume of maintenance actions, and therefore, the volume of source documents has also increased. Add to this the demand for more information from all levels within the logistics community, and the problems cited in the preceding paragraph become more and more prevalent. This increased volume must be processed on already overloaded and outdated Automated Data Processing Equipment (ADPE) and actually results in additional manual data collection requirements being levied on already overloaded personnel. [Ref. 31: p. 17] This leads to the proliferation of "locally designed systems" to satisfy the requirement for accurate and timely data.

These types of problems and deficiencies have received high level attention within the Navy and probably, more that any other area, led to the demand for a modern state-of-the-art MIS.

B. NALCOMIS BACKGROUND AND HISTORY

The NALCOMIS effort can best be described as an evolutionary process born out of the deficiencies of the 3-M System. In 1970, CNO established the Carrier Aircraft Maintenance Support Improvement (CAMSI) Project as a first step in identifying those areas that would improve carrier aircraft readiness. The CAMSI effort produced several findings. One such finding was that the improved use of ADPE was the most practical and cost effective means of attaining an acceptable level of efficiency in the management of shipboard aircraft maintenance and support.

In view of the CAMSI findings, the Shipboard Aviation Command Management Information System (SACOMIS) project was initiated in 1972 as a joint Naval Air Systems Command (NAVAIR) and Naval Supply Systems Command (NAVSUP) project. This project was undertaken to design and develop a MIS in response to CAMSI recommendations. The Management System Development Office (MSDO) and the Fleet Material Support Office (FMSO) were tasked with the design effort, and a project office was established within NAVAIR. Support for the project was provided by those areas of NAVAIR and NAVSUP responsible for ADP policy and procedures as well as Headquarters Marine Corps for Marine aviation matters. The SACOMIS Automated Data System (ADS) plan was approved in concept by CNO in 1974.

In 1974, CNO directed that the SACOMIS program be expanded to include Naval Air Stations (NASs), Marine Aircraft Groups (MAGs), Helicopter Aircraft Carriers (LPHs), Helicopter Assualt Aircraft Carriers (LHAs) and Marine Corps Air Stations (MCASs). It was also at this time that the program title was changed to the Naval Aviation Logistics Command Management Information System (NALCOMIS). Several initiatives were undertaken to ensure fleet participation during the design, development, and implementation phases.

In 1976, program management of NALCOMIS was changed to a newly established organizational entity within NAVAIR. In addition, it was during this timeframe that a decision was made to utilize the modular approach in the development of NALCOMIS. The initial module would be limited to the support of the OMA, the IMA, and the Supply Support Center (SSC) functions both afloat and ashore and has been identified as Module 1

of NALCOMIS. Other areas of the NAMP would be implemented as follow-on modules. The NALCOMIS Module 1 ADS plan was completed and submitted in October 1976, and certification was received in 1977. NALCOMIS has been designated as a program and is currently managed as such within NAVAIR.

Figure 2-2 presents a chronological representation of the NALCOMIS history. Throughout the remainder of this thesis, the term NALCOMIS refers to NALCOMIS Module 1.

C. MAJOR NALCOMIS OBJECTIVES

The overall broad objective of NALCOMIS is to provide a MIS which will assist the OMA, IMA, and SSC aviation maintenance and material managers in support of NAMP execution. The MIS will satisfy data requirements of aviation maintenance and material managers in a timely manner and provide data inputs to, and otherwise interface with, other major Integrated Logistics Support (ILS) systems in the Naval Aviation community. [Ref. 1: p.6]

The specific objectives as outlined in the NALCOMIS ADS plan are as follows:

(1) Develop a single, integrated, real-time automated standard MIS to assist maintenance and material managers in their day-to-day operations and decision making.

(2) Develop automated source data entry (SDE) techniques for data input by aviation maintenance and supply personnel.

(3) Develop a MIS with requisite capabilities to support the data requirements of certain Navy and Department of Defense (DOD) programs with less impact on the base level maintenance and material support functions.

1970 - CAMSI Project. Undertaken due to 3-M System deficiencies. Recommended use of improved ADP equipment.

1972 - SACOMIS Project. Joint NAVAIR/NAVSUP project. Undertaken to design a MIS in response to CAMSI recommendations.

1974 - SACOMIS ADS Plan approved. SACOMIS expanded to include shore NASs and MAGs. Name changed to NALCOMIS.

1976 - NALCOMIS ADS Plan submitted.

1977 - NALCOMIS ADS Plan approved.

1977 to Present - NALCOMIS design and development.

Figure 2-2 Chronological Representation of NALCOMIS History

These objectives were formulated on the premise that the Navy has no single, integrated, real-time, automated MIS to support the base and ship level management of aviation maintenance including data collection, intra-base data communication and up-line reporting functions.

The following additional specific objectives have been established within the overall objectives: [Ref. 1: pp. 6-9]

(1) Reduce the amount of time aircraft are in a non-operational status due to actual ongoing maintenance or awaiting maintenance. These reductions will be achieved by the following:

- improved local data communication capabilities,
- improved SDE procedures and techniques,
- improved visibility of existing maintenance workload and supply inventory,
- reduction of the clerical burden on maintenance and supply personnel,
- integration of supply and maintenance data bases.

(2) Reduce the amount of time aircraft are in a non-operational status or reduced material condition status due to supply. These reductions will be achieved by the following:

- enhanced data communications capabilities between maintenance, supply and base/ship level management,
- utilization of SDE devices for data acquisition,
- reduction in component turn-around and supply response times,
- increased available productive manhours resulting from a reduction in clerical functions,
- improved component tracking capability,
- improved visibility of on-hand material assets.

(3) Increase the productive output of maintenance and supply personnel through reduction of direct labor manhours in data collection, handling, control, collating, and communication. This increase in productivity will be achieved by the following:

- elimination of manually prepared source documents through source data automation,
- improved accuracy and accessibility of the data base,
- elimination of duplicate and redundant recording of data.

(4) Reduce supply issue and supply status times through:

- installation of source data automation capability,
- reduction in the clerical burden on supply and maintenance personnel.

(5) Reduce the amount of time required from the time a defective component is removed from an aircraft until it is made ready-for-issue (RFI). This reduction will be accomplished by the following:

- automation of the Individual Component Repair Listing (ICRL),
- improved workload scheduling,
- reduction of the clerical burden on maintenance personnel.

(6) Reduction in the number of Beyond the Capability of Maintenance (BCM) actions on components repairable locally. This reduction will be achieved mainly through an improved visibility of consumable piece part inventory in the SSC.

(7) Reduction in the manpower required in direct support of the MIS. This reduction will be accomplished through the following:

- standardization of hardware and software,
- utilization of SDE devices for data acquisition, thereby eliminating the need for manual data conversion and verification.

(8) Improvements in the quality and timeliness of data being reported in support of up-line management requirements. This improvement will be achieved by:

- integration of maintenance and supply data bases at the local level,
- utilization of an integrated "record length" reporting format,
- utilization of SDE devices,
- reducing the error rates in data being reported,
- fulfilling up-line requirements for data not previously available.

(9) Reduction in the inventory loss of components. This will be realized through the complete serialized tracking of each component from the time of removal through each step in the repair process until it is returned to the rota-table pool or to stock in RFI condition.

As can be seen, the above objectives represent a considerable undertaking, especially in designing a MIS within the environment of a complex system as represented by the maintenance and supply support of Naval Aviation.

D. MAJOR NALCOMIS FEATURES

Since its inception, NALCOMIS has been envisioned as a state-of-the-art, advanced MIS designed with the needs of the user in mind. [Ref. 1: pp. B-10, B-11] As presented in the NALCOMIS ADS plan, the MIS will possess the following features as a minimum:

. satisfy real-time information requirements of the base level aviation maintenance and material managers,

- satisfy the data reporting requirements for up-line information systems,

- satisfy mobility requirements of selected NALCOMIS operational sites, specifically 12 CVs, 12 LPHs/LHAs, 17 MAGs and deployable aircraft squadrons from 50 NASs and MCASs,

- satisfy minimum requirements for continuous operation of the MIS in a high readiness or mobilization environment considering:

  - vulnerability of hardware and software,

  - security of data communications between afloat and ashore activities,

  - satisfy fail-soft requirements to permit degrees of degraded mode operations versus total interruption.

Additionally, the following are important features deemed worthy of mention: [Ref. 1: p. 31]

- The system will utilize key Video Display Terminal (KVDT) devices for the collection and display of data;

- The system will be a totally integrated, interactive system with users having access to data resident in the centralized data base managed by a Data Base Management System (DBMS);

- The system is advertised as highly user-oriented. Examples are the use of common English rather than coded data and the system generation of data resulting from input of certain data.

E. NALCOMIS FUNCTIONS

Before addressing the specific functions of the NALCOMIS components, it is necessary to first present various design concepts that relate directly to the functional areas being considered. An appreciation of these design concepts should afford the reader a better understanding of subsequent discussions concerning NALCOMIS functions. The following are generalized design features and concepts of NALCOMIS that are highlighted throughout the NALCOMIS FD:

(1) Single point entry and validation of data will preclude the redundant entry of data and will validate the acceptability of data.

(2) Source data automation will assist the user by furnishing easy-to-use formats, system provided data to the maximum extent possible, direct entry of data precluding manual transcribing, and on-line edit and validation.

(3) The system will utilize pre-formatted displays.

(4) A report generator will be utilized and will permit the display of data in a format not previously described to the system.

(5) The system will provide interactive capability thus permitting a man/machine conversational mode. In addition, an ad hoc capability will allow the development of one-time programs on-line using the interactive and report generation capabilities.

(6) Data will be on-line and continually resident on direct access storage devices.

(7) The system will feature the capability to provide a statistical data file which accummulates data as actions occur as opposed to gathering statistics by review of historical data.

(8) The system will employ features such as multi-programming, integrated data base, data management, structural design and programming, use of high level languages, and a real-time capability.

(9) The system will utilize a Site Oriented Centralized and Integrated Data Base (SOCIDAB) which will contain all known data elements of the application.

As mentioned previously, NALCOMIS applies to three major segments of the local maintenance environment, namely the OMA, the IMA, and the SSC.

Maintenance/Material Control

Planned/Phased Scheduling
Unscheduled Maintenance
Work-In-Process

Tracking Material Requirements

Repairable Material
Consumable Material
Scheduled Removal Components
Technical Directive Change Kit

Maintenance Support

Reliability/Maintainability Analysis
Equipment Asset Management

Serial Number Tracking

Components (Location/Status)

Personnel Management

Master Roster

Configuration Management

Aircraft
Engines
Components
Technical Directive Compliance

Aircraft Inventory

Gains/Losses
Location

Readiness Status

Utilization Status
Subsystem Capability Impact Reporting (SCIR)

Additional Functions

3-M Reporting
Operation and Support (O&S) Reporting
Aircraft Accounting
Engine Accounting
3-M Monthly Summary
IFAR/FREDS Reporting

Figure 2-3 NALCOMIS Aviation Organizational Maintenance Functions

<u>Production/Material Control</u>

Individual Component Repair Listing
(ICRL) Management
Planned/Phased Scheduling

<u>Maintenance</u>

Components
Engines
Ground Support Equipment (GSE)
Work-In-Process Tracking

<u>Material Requirements</u>

Scheduled Removal Components
Repairable Assemblies/Subassemblies
Consumable Material
Technical Directive Change Kit

<u>Configuration Management</u>

Ground Support Equipment (GSE)
Precision Measuring Equipment (PME)
Engines
Components
Subassemblies

<u>Personnel Management</u>

Master Roster

<u>Maintenance Support</u>

Serialized Component Location/Status
Reliability/Maintainability Analysis
Equipment Asset Management/Utilization

<u>Additional Functions</u>

3-M Reporting
Operation and Support (O&S) Reporting
Engine Accounting
3-M Monthly Summary

Figure 2-4 NALCOMIS Aviation Intermediate Maintenance Functions

Repairables Management

Local Repair Cycle Asset (LRCA) Management
Awaiting Parts (AWP) Component Management
IOU Component Management
Repairables Management
Receipts from the Aircraft Intermediate Maintenance Department (AIMD)

Requisition Management

Demand Processing
Not Mission Capable Supply (NMCS) Requisitions
Partial Mission Capable Supply (PMCS) Requisitions
Requisition Status
Requisition Follow-up

Additional Functions

3-M Material Reporting (Aviation)
Operation and Support (O&S) Reporting
Engine Accounting

Figure 2-5 NALCOMIS Aviation Supply Support Management Functions

Within these three subsystems NALCOMIS, as envisioned, will perform approximately fifty major functions. These functions are listed by subsystem in Figures 2-3, 2-4, and 2-5. In view of the fact that the thrust of this thesis is directed toward the possible inclusion of NALCOMIS functions within the SUADPS-RT environment and the fact that a review of all NALCOMIS functions is considered beyond the scope of this thesis, only those functions that relate to the SSC will be examined. Additionally, the emphasis will be placed on the shipboard aspect.

As background information, the Aviation SSC functions as the single point of contact between the ship's Supply Department and the maintenance activities, namely the organizational and intermediate maintenance levels. The primary function of the SSC is to receive and process the material demands placed upon the Supply Department by the supported maintenance activities. Figure 2-6 represents a typical SSC organization.

The following major functions are performed by the SSC: [Ref. 1: pp.87-106]

1. <u>Demand Processing</u>

The SSC processes demands for repairables and piece parts. Material requests are received, properly identified, the material located and delivered to the requesting activity. Demands that cannot be satisfied locally generate a supply system requisition. The requesting activity is notified accordingly.

2. <u>Repairables Management</u>

The SSC has specific responsibility for the ship's allowance of repairable components. NALCOMIS envisions repairables management to describe the tracking of a repairable from the time it is removed from an aircraft or major component until one of the following conditions occur:

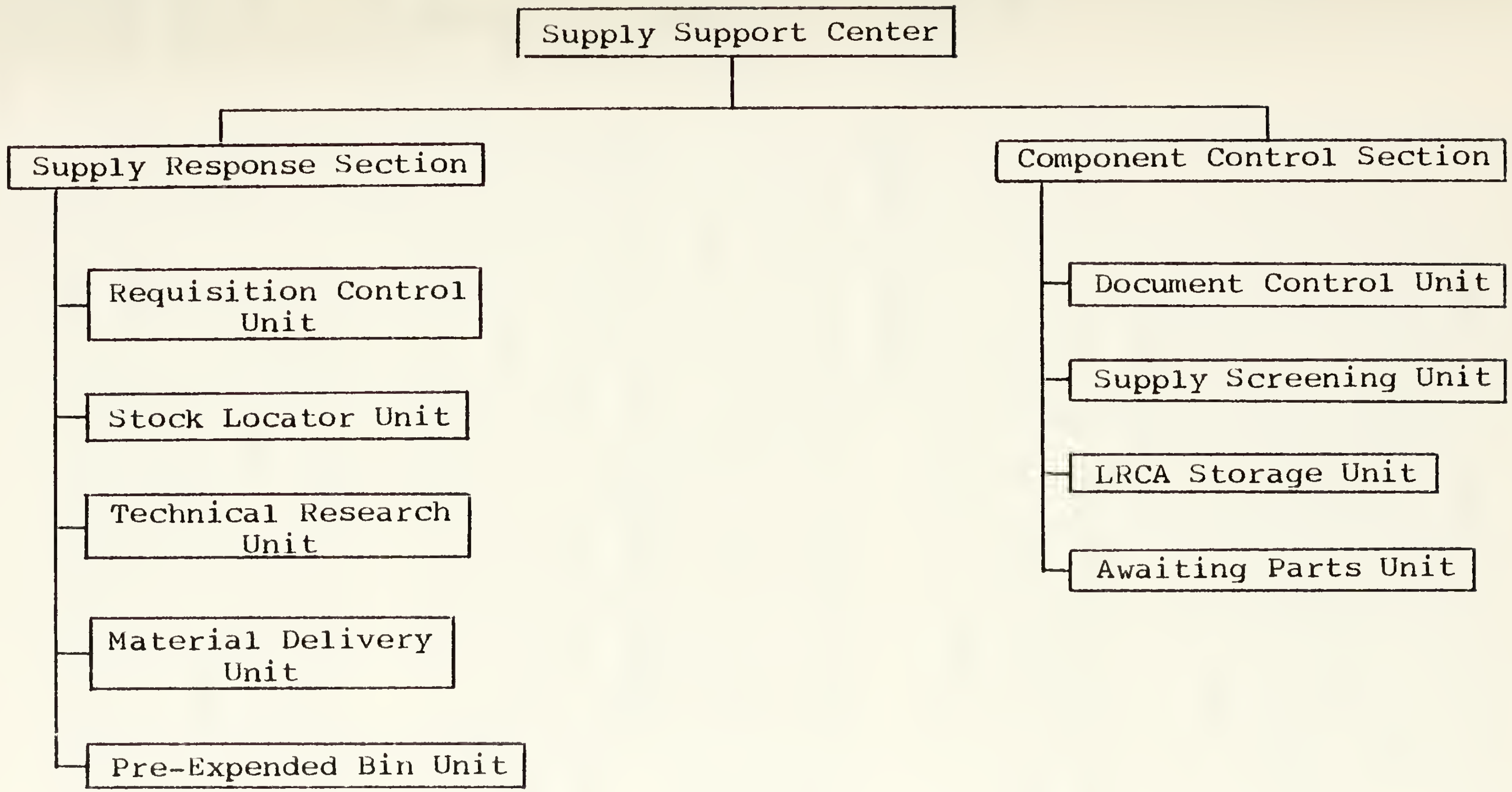

Figure 2-6 Supply Support Center Organization

- the repairable is repaired and returned to the aircraft or major component,
- the repairable is determined to be BCM and therefore shipped to another maintenance activity for repair,
- the repairable is repaired and placed in stock in RFI condition.

Repairables are classified under two groups:

(1) Local Repair Cycle Assets (LRCA),

(2) Other repairables.

The SSC must know each repairable item's asset position and the asset's location(s). The SSC must also make recommendations concerning the quantity of assets to be carried in inventory.

3. Component Screening

The screening function is concerned with the proper identification of NRFI repairable components turned in by the maintenance activities as well as both RFI and BCM components received from the IMA.

4. Awaiting Parts (AWP) Component Management

Components which cannot be immediately repaired due to the lack of repair parts are classified as Awaiting Parts (AWAP). The SSC is responsible for managing the actions required to obtain the parts needed for proper repair.

The above only highlight the major functions performed by the SSC and offer only a brief explanation of these broad areas. A review of Figures 2-3, 2-4, and 2-5 indicates that NALCOMIS currently plans to address these functions as well as additional areas under the responsibility of the SSC. Chapter IV of this thesis will examine the NALCOMIS functions in greater detail.

F. CHAPTER SUMMARY

The NAMP is a complex program designed to ensure the proper maintenance of aircraft and aviation components both afloat and ashore. One of the keys to the effective accomplishment of the NAMP objectives is the Navy Aviation Maintenance and Material Management System (3-M System); however, the 3-M System has become an outdated and inefficient system for processing the information and management needs of modern Naval Aviation. The deficiencies of the 3-M System have received high level attention and have resulted in the formulation of the Naval Aviation Logistics Command Management Information System (NALCOMIS) program. When implemented, NALCOMIS will offer an effective, modern, and efficient MIS to assist the management of Naval and Marine Corps aviation at all levels. The major objective of the NALCOMIS program is to provide a MIS which will assist the OMA, the IMA, and the SSC maintenance and material managers in support of NAMP execution. NALCOMIS will provide a single, integrated, real-time automated MIS that will feature source data automation/entry, on-line capability, intra-activity data communication and up-line reporting. NALCOMIS is envisioned as a totally user-oriented system capable of expansion to encompass all facets of logistics support of Naval Aviation.

III. SUADPS-RT FUNCTIONAL OVERVIEW

A. NAVY SUPPLY SYSTEM OVERVIEW

As indicated in Chapter I, the Navy Supply System is a multilevel system that encompasses virtually every naval activity. A complete review of the workings of the supply system is considered inappropriate at this point; suffice to say, the Navy Supply System comprises thousands of personnel and hundreds of activities, all performing tasks relative to the support of all naval units.

The Navy Supply System can best be described as an integrated system; integrated in the sense that it operates in conjunction with the Defense Logistics Agency (DLA) supply system. In particular, the Navy Supply System is that system under the direction of the Commander, Naval Supply Systems Command consisting of inventory managers and stock points which function to provide material to the operating forces of the Navy and shore establishment. Functions include, but are not limited to the following:

(1) procurement of material to satisfy overall system requirements,

(2) inventory control and management,

(3) financial accounting,

(4) transportation,

(5) receipt, storage and issue of material,

(6) data processing.

The Navy Supply System extends from the Naval Supply Systems Command, down through Inventory Control Points (ICPs), stock points, such as Naval Supply Centers (NSCs) and NASs, to ships and shore activities. It is a

complex system that relies heavily on ADP to accomplish many of its primary functions.

B. AFLOAT SUPPLY OVERVIEW

One area where the supply related functions impact and interface directly with the maintenance functions is in the aviation shipboard environment. Generally, the Supply Department afloat is responsible for several key functions, including general supply, aviation stores (if applicable), food service operations, disbursing, and ship's store operations. Within these functional areas, the Supply Officer is responsible for the procurement and requisitioning of material, as well as receiving, storing, issuing, shipping, transferring, selling and accounting for all stores and equipment in his custody. The accounting functions include allotment accounting, cost accounting, appropriation accounting, and property accounting. [Ref. 4] The Supply Officer afloat is a financial advisor as well as the individual responsible to the Commanding Officer for the material support of the command.

Within the scope of aviation maintenance, the Supply Department interfaces on a continuing basis with the maintenance activities. Specifically, and as indicated in Chapter II, the SSC is responsible for the effective supply support of assigned maintenance activities. The reader is referred to Figure 2-6 of Chapter II for a view of a typical SSC organization. In addition, Section E of Chapter II briefly describes the major functions of the SSC.

C. THE SHIPBOARD UNIFORM AUTOMATED DATA PROCESSING SYSTEM (SUADPS)

With the advent of general use ADP system applications to the shipboard environment in the early 1960s, came the need for a standard, shipboard ADP system to process the workload associated with Supply Department functions. Such a system, called the Shipboard Uniform Automated Data Processing System (SUADPS), was developed for operation on the AN/UYK-5(V) digital computer system, a small scale machine designed in the early sixties.

SUADPS is a batch processing, magnetic tape oriented, supply and financial accounting system programmed in assembly language. There are currently two versions that differ mainly in the financial area, specifically in the area of types of inventory funding. The first version, Shipboard Uniform Automated Data Processing System--End Use (SUADPS-EU), is applicable to aircraft carriers (CVs), amphibious assualt ships (LHAs/LPHs), and Marine Aircraft Groups (MAGs). SUADPS-EU is oriented to aviation activities with end-use funded inventories. The second version, Shipboard Uniform Automated Data Processing System-207 (SUADPS-207), is applicable to tenders (ADs/ASs), repair ships (ARs), combat stores ships (AFSs), and certain Shore Intermediate Maintenance Acitivites (SIMAs). These activities are oriented to ship intermediate maintenance and fleet resupply utilizing Navy Stock Fund (NSF) inventories.

There are two special procedures incorporated within the SUADPS-207 version that are not part of the standard SUADPS software. One, the High Priority Requisition Monitoring System (HI-PRI) deals with the processing of high priority requisitions by SUADPS-207 activities. The

other, the Underway Replenishment System (UNREP), is applicable to the issue of material to fleet customers by AFSs.

The basic SUADPS procedures cover virtually every functional area of the afloat supply department mission. Figures 3-1 and 3-2 list key mission support areas and also list the functional capabilities of the SUADPS system.

D. HARDWARE CONSIDERATION--THE AN/UYK-5(V) AND THE SHIPBOARD NON-TACTICAL ADP PROGRAM (SNAP)

The basic hardware suite in use in the fleet today, and the hardware that supports SUADPS, is the AN/UYK-5(V) computer. This computer was purchased by the Navy in the mid-sixties to support the shipboard non-tactical systems, such as the 3-M System and supply/financial operations.

The AN/UYK-5(V) suite of hardware consists of five pieces of equipment. The computer is a second generation serial processor possessing 16K words of core memory, one quarter of which is dedicated to the operating system. It has a magnetic tape unit with four transports and a controller, a card reader and a punch unit, a printer that has a sustained speed of 450 lines per minute, and a keyboard teletype unit. The system is physically large, occupying approximately 25 feet of wall space with each unit being approximately two to three feet deep. The central processor unit (CPU) is approximately six feet high. ADP applications on the AN/UYK-5(V) are sequential tape processing, and all systems procedures and methods are limited to printer, tape or card output and card or tape input. The computer does support a low level COBOL capability; however, the compiler is considered inadequate and compiled

<u>Procuring/Requisitioning</u>

Requisition Processing
Requisition Status Monitoring
Requisition History File
Automatic Reorder
Automatic Follow-up
Overage Requisition Analysis
Department Advice/Status on Oustanding Requisitions
Excess Requisition Cancellation

<u>Receiving</u>

Receipts
Receipts In-process
Receipt History
Requisition Reconciliation

<u>Storing</u>

Item Location Control
Inventory of Selected Categories of Items
Location Audit
Storeroom Action
Location Change History

<u>Accounting</u>

Posting Financial Transactions
Automated Transaction Item Reports for Specific Items
Automated Maintenance of Financial Records
Automated Inventory Manager Cyclic Asset Reports
Preparation of Accounting and Supply Reports
Magnetic Tape Exchange with FAADCs
Operating Target (OPTAR) History File Inquiry
Summary Management Analysis Reports
Processing Unfilled Orders

<u>Issuing</u>

Issue Recording
Issue Restriction
Suspended Issue Tracking
Demand and Frequency Accumulation

Figure 3-1 SUADPS Functional Capabilities

Inventory Management

Automated Adjustment of Stocked Levels
Automated Processing of Change Notice Actions
Repairable Item Management
Monitoring of Shelf-life Items
Local Management Control of Selected Items
Transaction Item Reporting
Maintenance of a Cross Reference File
Maintenance of Pool Allowances
Physical Inventory Aids
Change Notice Processing
COSAL, AVCAL, "Q" COSAL, Boat COSAL Load List Processing/Maintenance
General File Analyzer and Report Generator Capability
Automated Excess Computations
Posting All Transactions to Asset Status Records
Determining Inventory Adjustment Quantities
Validating MILSTRIP Data
Identifying Duplicate Documents
Substitute and Interchangeable Data
Preparing Access/Asset Reports
Validation of Input to Insure Record and Report Accuracy
Management Analysis of System Errors
Transaction Ledger Accumulation

Shipping

Shipping Invoice Preparation

Transferring

Automated Preparation of Off-Load Documents
Automated Off-Load
Production of Suspense Cards for Turn-Ins
Material Transfer to Other Activities

Selling

Automated Cash Sales

Figure 3-2 SUADPS Functional Capabilities

programs require too much memory and execution time to support major automated applications. [Ref. 5: p. 2-10] Most application programs are developed in assembly language.

The AN/UYK-5(V) has been a good computer for the fleet, but is now plagued by normal age problems as well as saturation. The system is approximately 17 years old and is experiencing mechanical problems. Mean time between failures is decreasing, and spare parts are a problem because the machine is now out of production. Add to this situation, the saturation of the system by increased workload and added applications. The result is a shipboard ADP environment that is characterized as follows: [Ref. 5: pp. 2-10, 2-11]

- ADP systems bound by inefficient use of large volumes of printed data and keypunch/card oriented data update;
- Outmoded sequential processing of large tape-oriented data files;
- Significant processing backlogs now plague the system;
- Significant system run time overhead caused by excessive system sort time;
- Applications software segmentation caused by restrictive memory capacity;
- CPU saturation and constrained application software and data base;
- Overall shipboard ADP equipment unreliability.

Due to the types of problems mentioned above, the CNO approved, in 1976, a replacement effort for the AN/UYK-5(V) system. This replacement effort has been named the Shipboard Non-Tactical ADP Program (SNAP). The program has two parts. The first, SNAP I, deals with the replacement of the AN/UYK-5(V); the second, SNAP II, deals with the installation of small, compatible, ADP systems on smaller ships. For the purpose of this thesis, only SNAP I is relevant.

SNAP I calls for two distinct phases. During Phase I it is planned to replace the mechanical tape transports and line printers now used in the AN/UYK-5(V) system. Phase 2 deals with the replacement of the CPU and those remaining peripherals not covered by Phase 1. In addition, Phase 2 will provide new executive level operating system software.

The following key specification and design features have been extracted from SNAP Program Office literature as well as the SUADPS-RT FD:

(1) The new system will be highly modular to facilitate installation and maintenance;

(2) The system will be expandable through the use of redundant architecture to achieve the large capacity required, and to ensure that the system fails soft, continuing to provide services and support while being repaired;

(3) The system will be able to address a minimum of 32 input/output (I/O) devices as initially installed and has the capability of expansion to address up to 256 devices for larger systems;

(4) The operating system software must include not only the real-time executive, but also ANSI-74 COBOL, programming utilities, maintenance diagnostics, tutorial system training aids, and a DBMS that is compliant, as close as possible, with the Conference on Data Systems Languages (CODASYL) recommendations;

(5) The environment must support:

- improved key to disk SDE capability,
- interactive query, validation and SDE in a multi-terminal remote communications environment,
- a disk-oriented, multi-programming, extended memory environment;

(6) Options for dealing with the existing applications software will be permitted to include the following:

- translation, using especially written software,
- emulation, using programmable read only memory firmware, or
- interface operations, in computer-to-computer mode, using hardware, or other black box replacement, for the old computer.

Of importance to the scope of this thesis is the fact that the Assistant Secretary of the Navy for Financial Management has directed that shipboard versions of NALCOMIS use the same computer system that is eventually selected under the SNAP program to replace the AN/UYK-5(V).

E. THE NEED FOR SUADPS-RT

With the realization that the deficiencies in the AN/UYK-5(V) hardware would be satisfied by the SNAP procurement, concerted effort to review the current SUADPS-EU and SUADPS-207 systems was undertaken. The results of these studies revealed the following: [Ref. 5, pp.2-11, 2-12]

(1) Deficiencies in overall SUADPS procedures and applications software capabilities can be isolated to two basic areas: (1) those created as a by-product of AN/UYK5-(V) system saturation; and, (2) limitations in capabilities imposed by the lack of interactive, disk-based, real-time processing support;

(2) The lack of a real-time, disk-based, interactive processing capability has prevented expansion of existing applications and development of new applications to meet pressing fleet requirements. In addition, the lack of interactive support has also contributed to inefficient SUADPS procedures for input and validation of source supply transactions;

(3) While the SNAP I, Phase 1 replacement of AN/UYK-5(V) tape drives and printers will improve system peripheral reliability and provide a small decrease in throughput time, the mandated functional support requirements of SNAP I fleet users can only be met by correcting the basic deficiencies in processing methodology by redesigning SUADPS applications software fully utilizing the SNAP I ADPE and associated state-of-the-art software.

The above deficiencies associated with the SUADPS system, as currently in operation on the AN/UYK-5(V), have manifested themselves in several areas that impact negatively on the ability of the afloat Supply Department to accomplish its assigned mission. [Ref. 5: p. 2-12] The following represent areas that have become adversely impacted due to the deficiencies of the current SUADPS situation: [Ref. 5: p. 2-12, 2-14]

- Large processing backlogs which lead to such problems as incomplete reorder of material because of outdated inventory data, inability to issue and/or locate material, and unnecessary delays in processing off-ship requisitions;
- Decreased tactical and strategic weapons system availablilty on board the ship;
- Lack of timely processing of financial data;
- Delays in processing supply and other related maintenance data, thus negatively impacting on the ability to process required reports, both on-ship and up-line.

The current SUADPS effort is plagued by old, saturated hardware, and this, in turn, has led to a situation best characterized by untimely availability of current supply management information.

In view of the above difficulties, as well as being faced with the opportunities being presented by the SNAP program, the decision was made to redesign the current SUADPS systems into an improved version (SUADPS-RT)

for operation on the SNAP hardware. The ADS plan for SUADPS-RT was completed in October 1979 and approved by the Assistant Secretary of the Navy for Financial Management in August 1980.

F. MAJOR SUADPS-RT FEATURES

Figure 3-3 presents a SUADPS-RT system overview. As this figure indicates, the system is envisioned as being able to support both inputs and outputs from various sources, such as an on-line Cathode Ray Tube (CRT) device and a batch mode process. Most of the features that will be present in the SUADPS-RT environment are those that deal directly with the updated SNAP I hardware capability as described in Section D of this chapter. Specifically, these features are centered around the improved on-line, real-time capability of the SNAP I hardware coupled with both a state-of-the-art operating system and a DBMS.

SUADPS-RT will accept inputs by real-time transaction entry and data query and will display data via CRT. These CRT devices can be used for such items as SDE of basic supply transactions, visual display of data in response to user query, and key communication devices between overall system components.

The primary means of transaction processing and system updates will be via direct-access devices. In addition, and as envisioned in the SNAP I environment, remote key-to-disk processing capability will be the primary mode of batch data collection. A batch transaction feature with system data update utilizing standard magnetic tape will be retained as part of the system capability.

System input and output may also utilize card media whereby data may be received from other activities for system processing. A backup

Reprinted from SUADPS-RT Functional Description

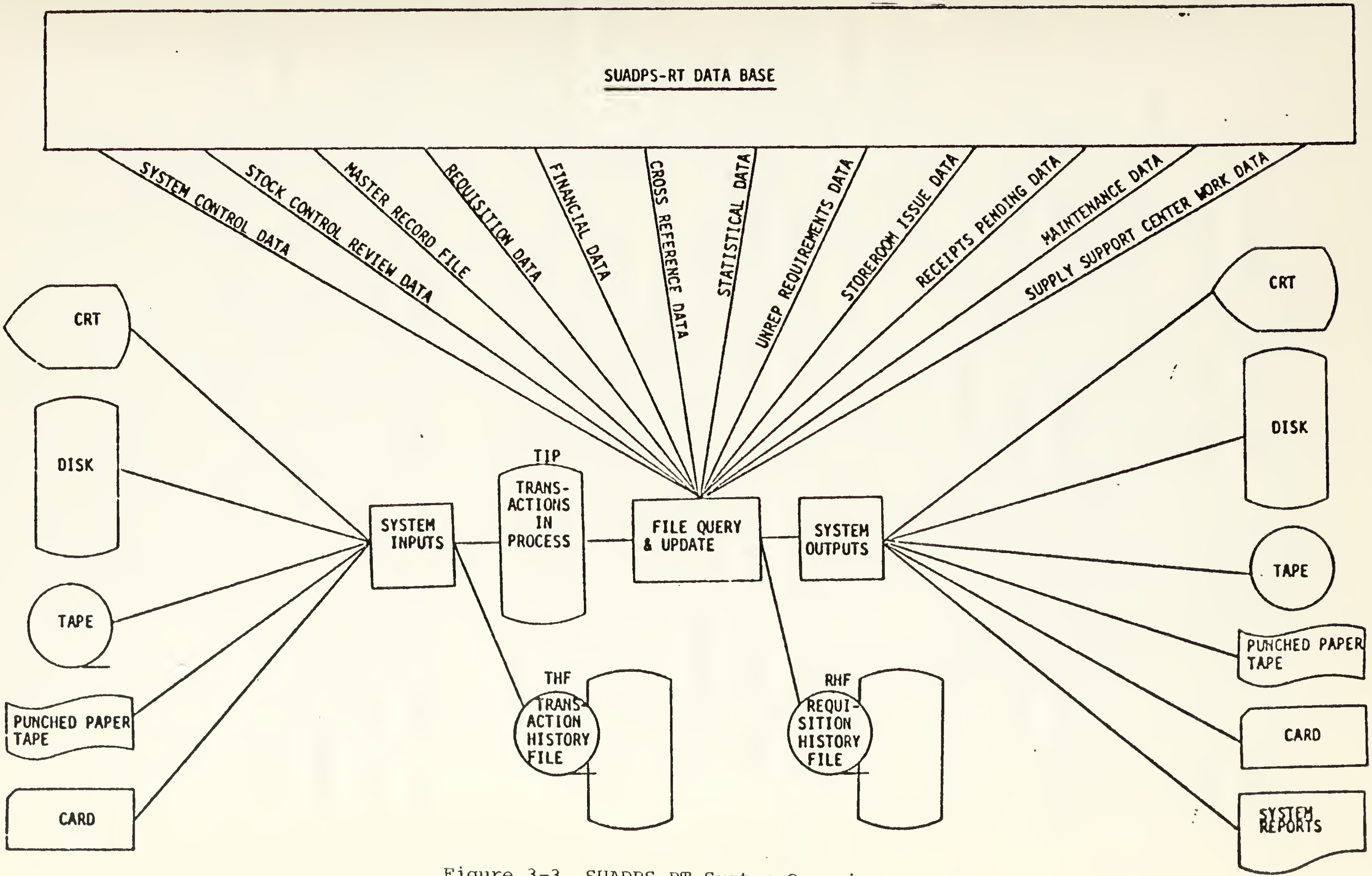

Figure 3-3 SUADPS-RT System Overview

capability will utilize compatible, standard, floppy disk storage capability in case the on-line interface is not operational. This storage medium can also be utilized for data exchange between different SUADPS-RT activities.

There are several additional system features too numerous to list here. The reader may refer to the SUADPS-RT FD and the System/Subsystem Specifications for the Shipboard Non-Tactical ADP Program (SNAP), SUADPS-RT, for a more thorough presentation of these features.

G. SUADPS-RT FUNCTIONS

SUADPS-RT will incorporate into one interactive applications system all existing functional capabilities of the SUADPS-EU and SUADPS-207 supply and accounting systems and ancillary UNREP and HI-PRI systems. [Ref. 5: p. 2-15] In addition, many fleet supply management requirements that could not heretofore be accomodated under the AN/UYK-5(V) serial processing environment will be developed and included as part of the SUADPS-RT system. These requirements include shipboard repairables management, automated technical requisition screen, and pre-post issues.

Figure 3-4 provides a summary breakdown of the key functional areas of the SUADPS-RT system. Since it is not apparent at this point which of these functional areas impact directly with the functional components of NALCOMIS as discussed in Chapter II, each area of Figure 3-4 will be described in brief as follows: [Ref. 5: pp. 3-3, 3-67]

Reprinted from SUADPS-RT Functional Description

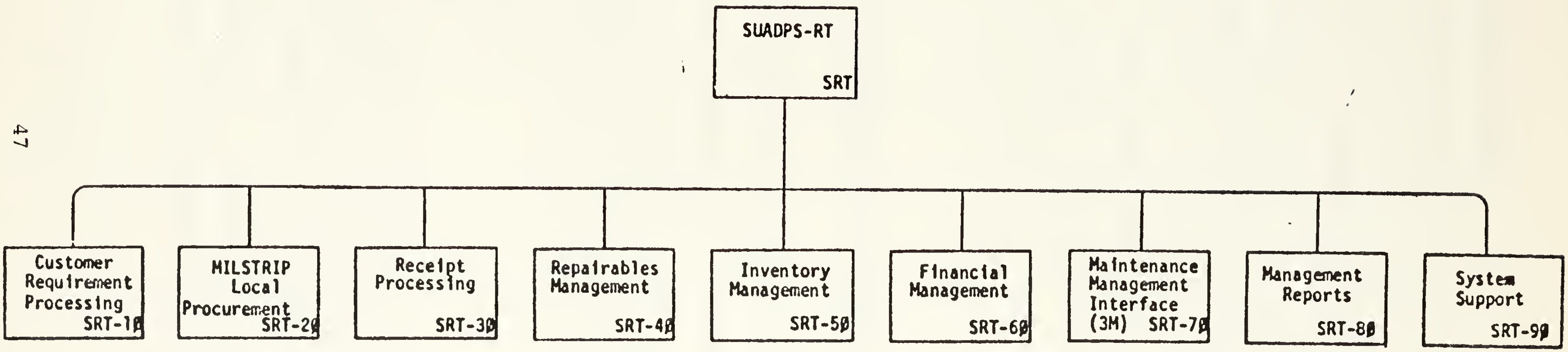

Figure 3-4 SUADPS-RT Key Functional Areas

1. Customer Requirement Processing

This function accomplishes such tasks as automated document number and accounting data generation, part-number to stock number determination, and the ability for management review of requirements. The function also includes a module designed to process material issue/transfer, including such tasks as procedures for internal (on-ship) requests and issues, as well as the procedures for external (off-ship) issues. This includes all of the procedures required for proper storeroom issue. Other tasks accomplished within this functional area include material turn-ins, transfers, and cash sales. Material turn-in will be further discussed under the general functional heading "Repairables Management."

2. Military Standard Requisitioning and Issue Procedure (MILSTRIP)/ Local Procurement

This function accomplishes such tasks as automated requisition preparation, requisition status modification, requirement validation, and requisition followup action. SUADPS-RT will incorporate an automated requisition preparation feature for processing off-ship orders. This feature will automatically process requisitions in accordance with standard MILSTRIP procedures.

3. Receipt Processing

This function accomplishes such tasks as preposting, actual receipt functions (both management and storage), and receipt posting. Receipts of material may be processed in batch mode or on-line. Procedures for handling receipts in process will also include both batch and on-line capabilities. The receipt posting subfuction also includes various

system update actions pertaining to files such as updating the stock record files, updating the outstanding requisition file, updating appropriate financial data, and posting necessary data to the maintenance and statistical data.

4. Repairables Management

The Repairables Management function accomplishes such tasks as issues of repairables, inventory management of repairables, and the generation of various reports that are required within the repairables management function. At the heart of this function is the real-time capability to insure a "one-for-one" exchange and "one-for-one" replenishment of repairable assets. This capability will include, but will not be limited to the automation of such functions as component identification, recovery, availability, condition, repair capability, repair cycle tracking, bit and piece visibility, fixed allowance adjustment data, and retrograde tracking. [Ref. 5: p. 3-33] The following is quoted from the SUADPS-RT FD:

> "The management of repairables in SUADPS-RT will be a supply function with interfaces to and from IMMS on the surface side and NALCOMIS on the aviation side providing information to be stored and retrieved in the data base. For query, then, one standard format of the data can be provided giving the asset picture."

In addition to the above, a key function of this area is the tracking of NRFI components. Again, the SUADPS-RT FD is quoted:

> "The NRFI assets must have visibility in the supply world and the tracking information will provide it. The maintenance systems, IMMS-RT and NALCOMIS, will interface with SUADPS-RT to provide the necessary information on the movement of the NRFI asset through the repair cycle."

Finally, several standard report formats will be provided. Of particular interest is the fact that many of these reports will be designed

for use by the SSC and include such areas as visibility of outstanding orders, items awaiting maintenance or awaiting parts, rotatable pool item lists, an IOU report of all outstanding assets from maintenance, and a tracking report of all items in work.

5. Inventory Management

Perhaps the most important functional area when considering only supply related procedures is that of Inventory Management. This function includes such tasks as data maintenance (stock records, etc.), automated stock reorder, automated levels computation, physical inventory, demand data accumulation, and reduction of inventory levels of slow moving stocks. Additionally, the Inventory Management function includes provisions for the management of Pre-expended Bin (PEB) material. PEB material is low cost, frequently used maintenance related items which are pre-expended from supply department stock and stored in departmental work centers for ready accessibility to maintenance personnel.

6. Financial Management and Accounting

Perhaps as equally important as the Inventory Management area is the functional area of Financial Management and Accounting. This area includes such areas as Operating Target (OPTAR) management, budget reporting, financial inventory reports, summary reports, unmatched expenditure management, and supported unit transfers. All of the financial functions provided within the SUADPS environment will be retained in SUADPS-RT. This includes all of the financial reports currently available with the additional capability of on-line query of any, or all, financial data accumulations. Transactions will process through financial

modules as they are input instead of waiting for a financial request to process, thus providing better visibility of the current financial picture. [Ref. 5: p. 3-50]

7. Maintenance Management Interface

The Maintenance Management Interface function accomplishes the task of interface requirements with the Maintenance Data System (MDS) and also a capability to produce an IMA Job Status Report. The purpose of the interface with the MDS is to provide a standard method to identify and record parts usage on installed equipment/aircraft. [Ref. 5: p. 3-58] The IMA Job Status Report will be used by both supply and maintenance activities to verify that parts are correctly requisitioned for work requirements.

8. Management Reports

SUADPS-RT will provide for a variety of management reports to assist all levels of management. An explanation of all possible reports is beyond the scope of this study; however, in general, the reports will fall into such categories as order analysis, asset visibility, file reports, and specialized reports. Examples of reports include requisition history, not-in-stock (NIS) reports, various asset reporting reports, as well as reports involving effectiveness and various statistical data.

9. System Support

The functional area of System Support will accomplish such tasks as file maintenance, software maintenance, input scheduling/queueing, and general system support. Since these functions tend to deal with the specifics of hardware and software management rather that those functions relating to supply and maintenance workload, this area will not be examined further.

The above gives a very general description of each of the functional areas as depicted in Figure 3-4. For a more detailed examination of these functions including various descriptions of actual processes, the reader is referred to Section 3 (Detailed Characteristics) of the SUADPS-RT FD.

H. CHAPTER SUMMARY

The Navy Supply System is an integrated system that performs various logistics support functions including inventory control and management, financial accounting, receipt, storage and issue of material and data processing. In an aviation afloat environment, the supply department of the ship interfaces constantly with the maintenance activities to ensure a proper level of supply support.

With the advent of general use ADP systems to the shipboard environment in the early 1960's, the Navy developed and implemented a standard ADP system called the Shipboard Uniform Automated Data Processing System (SUADPS). This system functioned to process virtually all supply department workload requirements. There are two versions of SUADPS. One, SUADPS-End Use (SUADPS-EU), applies to end-use funded inventories applicable to aircraft carriers (CVs), amphibious assault ships (LHAs/LPHs) and Marine Air Groups (MAGs). The second version, SUADPS-207, applies to NSF inventories applicable to tenders, repair ships and combat stores ships. SUADPS is a batch processing, magnetic tape oriented supply and financial accounting system programmed in assembly language.

Both versions of SUADPS operate on the AN/UYK-5(V) digital computer purchased in the mid-sixties. Today, this hardware can best be

described as both saturated and very low in reliability. Due to this fact, the Navy is currently in the process of replacing the AN/UYK-5(V). This replacement effort is being managed as the Shipboard Non-Tactical ADP Program (SNAP). The objective of SNAP is to provide an up-to-date, state-of-the-art replacement computer system for the AN/UYK-5(V), including a disk-oriented, multi-programming, interactive query system.

With the SNAP initiative, the need to redesign the SUADPS system was realized. To this end, the Navy is currently developing the Shipboard Uniform Automated Data Processing System-Real Time (SUADPS-RT) for operation on the SNAP hardware. SUADPS-RT is characterized as both an on-line and batch system centered around on-line, real-time transactions coupled with both a state-of-the-art operating system and a DBMS. SUADPS-RT will accept real-time transaction entry, data query and will display data via CRT.

SUADPS-RT will incorporate into one interactive applications system all existing functional capabilities of the SUADPS-EU and SUADPS-207 supply and accounting systems and ancillary UNREP and HI-PRI systems. In addition, many fleet supply management requirements that could not heretofore be accomodated will be developed and included as part of the SUADPS-RT system. The major functional areas of SUADPS-RT are as follows:

- Customer Requirement Processing
- MILSTRIP/Local Procurement
- Receipt Processing
- Repairables Management
- Inventory Management
- Financial Management and Accounting

- Maintenance Management Interface
- Management Reports
- System Support

The above were briefly examined within the chapter.

IV. NALCOMIS/SUADPS-RT FUNCTIONAL COMPARISON

A. NALCOMIS/SUADPS-RT FUNCTIONS COMPARED

Chapters II and III very generally discussed the functions of NALCOMIS and SUADPS-RT respectively. Specifically, the two systems were reviewed for those functions relating to the management of aviation supply support afloat. Figure 4-1 lists the supply support functions of both systems.

From the material presented to this point, it is obvious that some overlap and duplication between the two systems exists. In order to determine those areas where duplication exists, it was necessary to outline the functions and subfunctions of NALCOMIS and compare them to the functions and subfunctions of SUADPS-RT. This comparison was accomplished utilizing the FDs of both systems and is presented in summary format as Appendix A. The basic format of Appendix A is as follows:

Column 1: The NALCOMIS major function is listed in Column 1 followed by the subfunctions within each major function.

Column 2: A brief explanation of each subfunction and the tasks accomplished is listed in Column 2.

Column 3: Column 3 lists the applicable subfunction within SUADPS-RT that addresses and/or accomplishes the NALCOMIS subfunctions. If SUADPS-RT does not address or accomplish the task then Column 3 is so indicated by "None."

B. SUMMARY OF FUNCTIONAL DUPLICATIONS

As Appendix A displays, the NALCOMIS functions pertaining to the SSC and the functions contained in SUADPS-RT are duplicatory in several areas.

NALCOMIS Major Functions Relating to Supply Support Management

- Demand Processing
- Repairable Management
- Rotatable Pool Managment
- AWP Component Management
- Aviation Maintenance Screening Unit (AMSU) Requirements

SUADPS-RT Major Functions

- Customer Requirement Processing
- MILSTRIP/Local Procurement
- Receipt Processing
- Repairables Management
- Inventory Management
- Financial Management and Accounting
- Maintenance Management Interface
- Management Reports
- System Support

Figure 4-1 NALCOMIS/SUADPS-RT Major Functions

Specifically, Figure 4-2 displays those functional areas where duplication exists. It is considered appropriate to mention the criteria utilized for arriving at these duplications. These criteria are as follows and are annotated on Figure 4-2:

(1) When the functions matched directly then an obvious duplication occurred. For example, both systems require the capability to monitor requisition status via query mode. This represents a direct duplication of tasks and functions. These direct duplications are listed as "SUADPS-RT Direct Duplications" on Figure 4-2.

(2) When the functions matched in the achievement of end results, then a duplication of functional significance occurred. For example, both systems require the capability to manage IOU repairables, and, as such, both systems specifically address this issue. These functionally significant duplications are listed as "SUADPS-RT Functional Duplications" on Figure 4-2.

As can be seen, nine NALCOMIS subfunctions matched directly and six matched functionally with SUADPS-RT functions. In addition, and as indicated, some subfunctions are addressed by more than one functional area of SUADPS-RT.

C. SUMMARY OF FUNCTIONAL DIFFERENCES

The remaining subfunctions of NALCOMIS are not directly addressed within the SUADPS-RT FD. These subfunctions are listed in Figure 4-3.

D. EVALUATION OF FUNCTIONAL DIFFERENCES

The following evaluation of the functional differences listed in Figure 4-3 are provided. These evaluations include such areas as extent

NALCOMIS Subfunctions	SUADPS-RT Direct Duplications	SUADPS-RT Functional Duplications
1. Material Requests	MILSTRIP/Local Procurement	Customer Requirement Processing
2. Requisition Status	MILSTRIP/Local Procurement	
3. Update of Material Demand	Inventory Management	
4. NMCS/PMCS Data		Inventory Management
5. Issue Response Time Data		Customer Requirement Processing Repairables Management
6. IOU Status		Repairables Management
7. Component Disposition Documents		Repairables Management
8. Lack of Parts Status Reports	Repairables Management	

Figure 4-2 NALCOMIS/SUADPS-RT Functional Duplications
Page 1

NALCOMIS Subfunctions	SUADPS-RT Direct Duplications	SUADPS-RT Functional Duplications
9. Initiation of Rotatable Pool File	Repairables Management	
10. Updating of Rotatable Pool File	Repairables Management	
11. Rotatable Pool Report		Repairables Management
12. Rotatable Pool Data		Repairables Management
13. Initiation of AWP Component Management File	Repairables Management	
14. Updating of AWP Component Management File	Repairables Management	
15. AWP Component Management Data	Repairables Management	

Figure 4-2 NALCOMIS/SUADPS-RT Functional Duplications
Page 2

- Component Status
- Component Turn-Around-Time (TAT) Analysis
- Initiation of Master Component Repair Listing (MCRL) File
- Updating of MCRL File
- AMSU Screening Requirements

Figure 4-3 NALCOMIS Subfunctions Not Specifically Addresses by SUADPS-RT

of differences, impact on accomplishment of the function, and the feasibility, from a functional point of view, of incorporating these subfunctions within the SUADPS-RT system.

1. Component Status

The Component Status subfunction of NALCOMIS refers to the capability of SSC personnel to obtain component status information on repairable components. Basically this refers to the capability to tract the component not only through the phases of supply related functions, but also through the actual repair cycle once the component is forwarded to the IMA. While SUADPS-RT will afford the capability to tract the component, both in RFI and NRFI condition throughout the repair process, the actual tracking of the component while in the IMA repair cycle will not be available. The SUADPS-RT FD states that the tracking of components through the repair cycle will be accomplished by an interface with NALCOMIS.

The absence of this function from the SUADPS-RT system should not impact upon the SSC mission. SUADPS-RT will provide a consistent tracking capability for all components. The addition of information concerning actual movement of individual components through the actual repair cycle within the IMA would not effectively add to the SSC's ability to accomplish its repairable management function; however, this type of information would be of value to maintenance managers. Therefore, its importance is not meant to be slighted.

Finally, the addition of this information within SUADPS-RT would require an additional input requirement on the part of the maintenance activity each time the component status changed. Overall, the usefulness of this information from the SSC perspective is questionable.

2. Component Turn-Around-Time (TAT) Analysis

The idea of overall component TAT is not specifically addressed within the SUADPS-RT documentation; however, the capability to capture this information on various aspects of the supply related functions is possible. TAT refers to the total amount of time components are in each of the supply and maintenance status conditions, and, as envisioned, SUADPS-RT does not specifically address the elapsed time that components are actually in various stages of repair within the IMA.

Again, the absence of such detailed information should not seriously impact upon the SSC mission. SUADPS-RT will be able to provide TAT analysis based on elapsed times and a tracking report of all items in work will also be provided. As was indicated in the discussion concerning Component Status, the need for detailed information on the times required within the IMA would be of value to the maintenance managers, but its applicability to the SSC is considered minimal.

3. Initiation of Individual Component Repair Listing (ICRL) File, Updating of ICRL File, AMSU Screening Requirements

SUADPS-RT does not address the inclusion of the IMA ICRL in a separate, on-line file capability, although the SNAP 1 System/Subsystem Specifications for SUADPS-RT states that portions of the ICRL will be accessible. The ability to ascertain local repair capability on items is considered valuable to both supply and maintenance personnel. The ability to determine repair capability on-line can lead to better decision-making regarding local workloads, priorities, and component disposition. In addition, those items that do not indicate local repair capability, but which are system coded as local repair, can be highlighted for research by both supply and maintenance personnel.

Finally, the current procedure for performing the AMSU screening function requires an inordinate amount of resources, both time and manpower. [Ref. 6: p. 103] Often, components are delayed in the screening process due to manual screening backlogs. This is especially true during periods of sustained flight activity. The inclusion of ICRL data in the form of repair capability within the SUADPS-RT data base and the ability to access this data in an on-line, real-time environment will lessen the requirement for heavy manual effort. This in turn will lead to a more efficient screening function.

E. CHAPTER SUMMARY

A comparison of NALCOMIS functions and subfunctions with SUADPS-RT functions indicates duplication in a majority of functional areas. A complete comparison of functions considered duplications is provided in Figure 4-2. Of the twenty NALCOMIS subfunctions pertaining to the SSC, fifteen either display direct duplication with SUADPS-RT functions or display significant duplication in the achievement of end results. The remaining five subfunctions of NALCOMIS do not specifically duplicate any functions currently within SUADPS-RT. These subfunctions are listed in Figure 4-3.

The five subfunctions of NALCOMIS not duplicated within SUADPS-RT are examined in Section D of the Chapter. The Component Status and Component TAT Analysis subfunctions appear oriented mainly for the maintenance consideration for the tracking of components actually within the repair facility. From an SSC mission standpoint, the value of incorporating these subfunctions within SUADPS-RT is questionable.

The three subfunctions dealing with AMSU screening requirements appear of value to both supply and maintenance personnel and as such should be included within SUADPS-RT.

V. CONCLUSIONS AND RECOMMENDATIONS

This thesis has examined the functional capabilities of two important ADP related MISs--NALCOMIS and SUADPS-RT. Research was limited to the examination of the functions performed within the supply support subsystem of NALCOMIS with a subsequent comparison of these functions to the SUADPS-RT system. The thesis approached the research effort with the basic assumption that the NALCOMIS functions would be examined for possible inclusion within SUADPS-RT. Specifically, one of the major objectives of the research was to determine if duplications exist between the two systems and to determine those functional areas within NALCOMIS that warrant possible consideration for inclusion within SUADPS-RT. Based upon the research conducted, the following conclusions are presented:

(1) Both systems are comprehensive systems that represent massive undertakings. NALCOMIS addresses the entire range of maintenance activities throughout the OMA, IMA, and SSC. SUADPS-RT addresses the entire range of Supply Department functions afloat.

(2) Both systems are currently designed and currently being developed for use on the SNAP hardware which is a procurement initiative to replace existing fleet hardware. Both systems are therefore classified as on-line, real-time MISs with state-of-the-art hardware and software. Both systems are virtually identical in their description of the hardware and operating system environment.

(3) The supply support subsystem within NALCOMIS represents a relatively small portion of the overall NALCOMIS initiative. Of the

five major functions within the NALCOMIS FD that apply to supply support, four are similar enough, either directly or functionally, so as to consider them identical with functions listed in the SUADPS-RT FD. The remaining function, while not addressed specifically within the SUADPS-RT FD, represents an important aspect of both the maintenance and supply functions and, if included within SUADPS-RT, would enhance the overall accomplishment of the SSC mission.

(4) If the NALCOMIS initiative were terminated, those functions of aviation supply support afloat currently envisioned within NALCOMIS would not be lost. Rather, and as indicated above, they are included within SUADPS-RT.

The conclusions reached as a result of the research match the intuition of the author. Both systems address identical functional areas and both systems are being designed and developed within the hardware environment of the SNAP program. Nevertheless, the fact that duplications exist suggests that further analysis of the two systems is warranted. The maintenance and material managers of Naval Aviation need a MIS designed to lessen the manual efforts characterizing the information systems in use today. A modern and effective computerized MIS will unquestionably improve the logistics management of Naval Aviation.

In the final analysis, the fact that the systems are duplicatory suggests two possible situations:

(1) The process for analyzing and designing systems across functional areas is lacking in that duplications occur,

(2) The areas of aviation maintenance and supply support are so closely related as to be, in effect, one functional logistics system.

The opinion of the author is that both of the above situations apply to NALCOMIS and SUADPS-RT.

The following recommendations are offered:

(1) If NALCOMIS remains a viable and supportive initiative, then an in-depth program should be undertaken to identify an interface between NALCOMIS and SUADPS-RT. This interface should address all functional areas of NALCOMIS and should eliminate the duplications highlighted in this thesis.

(2) If NALCOMIS is terminated, then the functional area of NALCOMIS pertaining to the screening requirement should be examined for inclusion within SUADPS-RT. In this regard, the reference in the SUADPS-RT FD relating to the mechanization of the IMA repair capability should be clarified.

(3) A final recommendation applies to a more general view of the two systems. The opinion of the author is that the subsystem of NALCOMIS that pertains to the SSC should be eliminated and its functional requirements absorbed within SUADPS-RT. This approach would not only alleviate unnecessary duplications, but would also enhance overall SUADPS-RT capabilities.

APPENDIX A

COMPARISON OF NALCOMIS/SUADPS-RT FUNCTIONS

NALCOMIS Functions and Subfunctions	General Tasks Performed	Applicable SUADPS-RT Function(s)
• Demand Processing		
(1) Material Requests	The system automatically generates an issue order and udates material demand. Determines if requested material is rotatable pool or non-rotatable pool and takes appropriate action based on status. Prepares demand request for input into SUADPS. The determination of non-availability will result in generation of a material requisition for passing to the main Supply Department from the SSC.	Customer Requirement Processing MILSTRIP/Local Procurement
(2) Requisition Status	Requisition status available on query basis. Pre-formatted status informational displays will be available by requisition number, job control number, by all requisitions applicable to a specific aircraft bureau number, etc. The system will alert the SSC when requisition demand follow-up action is required.	MILSTRIP/Local Procurement
(3) Update of Material Demand Record	The system provides the capability to update the material demand record utilizing a pre-formatted update input. Updates may result in adding status data and/or changing data already contained in the record.	MILSTRIP/Local Procurement Inventory Management

(4)	NMCS Data	Requirement exists to perform daily reconciliation of NMCS requisition status records within the OMA. Differences are then reconciled with the SSC.	Inventory Management
(5)	Issue Response Time Data	As a result of the tracking of the material demand record, the system will have a record of all the time spent in each processing function. The system can then report issue response times. The information can aid management in the establishment and attainment of processing time standards.	Customer Requirement Processing Repairables Management

- Repairables Management

(1)	IOU Status	The IOU Status is concerned with the control of those repairable items for which a replacement item has been issued and for which a defective item has not been returned. The system will provide, on a query basis, data relative to outstanding IOUs by activity, by item, or by outstanding IOUs.	Repairables Management
(2)	Component Disposition Documents	Upon compilation of processing by the IMA and the SSC, an item is either returned to the rotatable pool, returned to Supply stock or shipped to a designated overhaul point.	Repairables Management

		Allocation to stock will be identified in the component record during initial processing of the item by the SSC. The system will automatically prepare the documentation tp process the component to its correct disposition.	
(3)	Component Status	SSC personnel will acquire component status information through the NALCOMIS integrated data base.	None
(4)	Lack of Parts Status Report	The system will provide a listing of all BCM actions that result from a lack of available parts. Such information as the Maintenance Action Record (MAR), material requested, date, and time ordered and status of material request will be provided for each such BCM action.	Repairables Management
(5)	Component Turn-Around-Time (TAT) Analysis	TAT is the accumulation of all time a component has spent in each of the repair processing phases. The system will provide SSC and IMA managers comprehensive data in meaningful time increments for TAT analysis, the goal being reduced TAT. The system will generate a report listing on a monthly basis of all repairable actions and the time the component was in each of the supply and maintenance status conditions.	None

- Rotatable Pool Management

(1) Initiation of Rotatable Pool File	The system will provide an input format developed specifically to facilitate data entry for the establishment of a Rotatable Pool File. This file will be the basis for the management of the Rotatable Pool by SSC personnel.	Repairables Management
(2) Updating of Rotatable Pool File	Necessary revisions to the Rotatable Pool File such as quantity changes, additions and deletions, etc. will be accomplished utilizing system procedures, thereby making updates to the Rotatable Pool File user oriented.	Repairables Management
(3) Rotatable Pool Data	The quantity of a component carried in the Rotatable Pool consists not only of items designated as RFI but also items due from an activity, items currently undergoing repair and items in AWP status. The Rotatable Pool File will contain data based on availability, component identification, in-work information, etc. Displays will be available on a query basis and the system will alert management when pre-established low level limits have been reached. This current pool status information is vital to management decisions at all activities, namely the OMA, IMA, and the SSC.	Repairables Management Inventory Management

(4)	Rotatable Pool Effectiveness Report	The system will prepare a monthly Rotatable Pool Effectiveness Report depicting the percentage of demands filled by pool stock during the previous month. In addition, the report may also reflect the percentages during the preceding six months for trend analysis.	Repairables Management

• AWP Component Management

(1)	Initiation of AWP Component Management File	The system will utilize a file consisting of AWP component records for the management of AWP components. The system will provide an input format developed specifically to facilitate data entry for the establishment of the file.	Repairables Management
(2)	Updating of AWP Component Management File	Necessary revisions to the AWP Component Management File such as additions, deletions, status changes, etc. will be accomplished utilizing system procedures, thereby making updates user oriented.	Repairables Management
(3)	AWP Component Management Data	The system will assist management by providing greater visibility of requirements, monitoring of outstanding material status and ready access to required information. Pre-formatted query displays will be developed to provide management with current AWP	Repairables Management

	status by Job Control Number (JCN) and Work Unit Code (WUC), thereby providing ready review of AWP components for possible cannibalization candidates. Additionally, the system will monitor outstanding material requirements and will alert management when a specific component has been in AWP status in excess of a prescribed time period.	
• Aviation Maintenance Screening Unit (AMSU)		
(1) Initiation of Individual Component Repair Listing (ICRL) File	The system will implement and utilize a file consisting of the IMA ICRL. The system will provide an input format developed specifically to facilitate data entry for the establishment of this file.	None
(2) Updating of ICRL File	Necessary revisions to the IMA ICRL file such as additions, deletions, changes to IMA repair capability, etc. will be accomplished utilizing system procedures, thereby making updates user oriented.	None
(3) AMSU Screening Requirements	When a repairable component is sent from the OMA to the IMA, the system will compare the identification data in the pertinent MAR and the ICRL record. When a match is found, the system will automatically enter the	None

responsible IMA work center in the MAR. When a match is not found, SSC personnel will be alerted by a display of the defective component's identification data and a message indication that the item is not contained in the ICRL. Appropriate BCM action will then be taken.

APPENDIX B

GLOSSARY/ACRONYM LIST

AD	Destroyer Tender
ADP	Automatic Data Processing
ADPE	Automatic Data Processing Equipment
ADS	Automated Data System
AFS	Combat Store Ship
AIMD	Aircraft Intermediate Maintenance Department
AMSU	Aeronautical Maintenance Screening Unit
AR	Repair Ship
AS	Submarine Tender
AVCAL	Aviation Consolidated Allowance List
AWP	Awaiting Parts
BCM	Beyond Capability of Maintenance
CAMSI	Carrier Aircraft Maintenance Support Improvement
CNO	Chief of Naval Operations
CODASYL	Conference on Data Systems Languages
COSAL	Consolidated Shipboard Allowance List
CPU	Central Processor Unit
CRT	Cathode Ray Tube
DBMS	Data Base Management System
DLA	Defense Logistics Agency
DOD	Department of Defense
DOP	Designated Overhaul Point
EAM	Electronic Accounting Machine

FAADC	Fleet Accounting and Disbursing Center
FD	Functional Description
FMSO	Fleet Material Support Office
FREDS	Flight Readiness Evaluation Data System
GSE	Ground Support Equipment
HI-PRI	High Priority Requisition Monitoring System
ICP	Inventory Control Point
ICRL	Individual Component Repair List
IFAR	Individual Flight Activity Reporting
ILS	Integrated Logistics Support
IMA	Intermediate Maintenance Activity
IMRL	Individual Material Readiness/Requirements List
I/O	Input/Output
IOU	I Owe You
JCN	Job Control Number
KVDT	Key Video Display Terminal
LHA	Amphibious Assualt Ship, General Purpose
LPH	Amphibious Assualt Ship, Helicopter
LRCA	Local Repair Cycle Assets
MAG	Marine Aircraft Group
MAR	Maintenance Action Record
MCAS	Marine Corps Air Station
MDS	Maintenance Data System
MILSTRIP	Military Standard Requisitioning and Issue Procedure
MIS	Management Information System
MSDO	Management System Development Office (Decommissioned)

NALCOMIS	Naval Aviation Logistics Command Management Information System
NAMP	Naval Aviation Maintenance Program
NARP	Naval Air Rework Facility
NAS	Naval Air Station
NAVAIR	Naval Air Systems Command
NAVSUP	Naval Supply Systems Command
NIS	Not In Stock
NMCS	Not Mission Capable, Supply
NRFI	Not Ready for Issue
NSC	Naval Supply Center
NSF	Navy Stock Fund
OMA	Organizational Maintenance Activity
OPTAR	Operating Target
O&S	Operating and Support
PEB	Pre-expended Bin
PMCS	Partial Mission Capable, Supply
PME	Precision Measuring Equipment
RFI	Ready For Issue
SACOMIS	Shipboard Aviation Command Management Information System
SCIR	Subsystem Capability Impact Reporting
SDE	Source Data Entry
SIMA	Shore Intermediate Maintenance Activity
SNAP	Shipboard Non-Tactical ADP Program
SOCIDAB	Site Oriented Centralized and Integrated Data Base
SSC	Supply Support Center

SUADPS	Shipboard Uniform Automated Data Processing System
SUADPS-EU	Shipboard Uniform Automated Data Processing System-End Use
SUADPS-RT	Shipboard Uniform Automated Data Processing System-Real Time
TAT	Turn-Around-Time
TDC	Technical Directive Compliance
UNREP	Underway Replenishment System
WUC	Work Unit Code
3-M	Maintenance and Material Management System

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Thesis 198809
R6657 Rodenbarger
c.1 A functional comparison of the naval aviation logistics command management information system (NALCOMIS) and the shipboard uniform automated data processing system-real time (SUADPS-RT).